Wesley M. Eddy

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Research Interests

I am broadly interested in internetworking and communications. Specific topics that I have interests in include:

- delay/disruption-tolerant networking protocols
- network mobility techniques
- transport protocol design and implementation
- end-to-end congestion control and active queue management algorithms
- cryptographic techniques and protocol implementation

Education

- M.S. in Computer Science
  Ohio University, 2004.
  Thesis: *Improving TCP Performance with Path Error Rate Information*
  Advisor: Shawn Ostermann
- B.S. in Computer Science, Cum Laude
  Ohio University, 2002.

Relevant Skills: Fluent in C/C++, Python, Scheme, TCL, and 6502 assembly programming. Experience with many other programming languages, and the ability to learn them quickly. Unix administration. Linux/BSD kernel modifications. Network communications protocol design and implementation. Cryptographic algorithms.

Relevant Courses: Operating Systems I & II, Computer Networking, Advanced Networking, Information Theory, Communications Engineering, Network Engineering, Real-time Systems, Algorithms I & II, Computation Theory, Parallel Computation Theory, Neural Networks, Control Theory, Computer Security and Cryptography, Programming Languages, Formal Languages and Syntactic Analysis, Artificial Intelligence, Model Checking, Databases, Abstract Algebra, Numeric Analysis, Quantum Physics, Astrophysics, Observational Astrophysics, Natural Resource Economics.

Work Experience

- **Verizon Federal Network Systems** 2004 - current

  Position: Specialist - Network Engineering

  I currently serve Verizon FNS as an on-site contractor at NASA's Glenn Research Center in Cleveland, Ohio, in support of the Networking branch of NASA's Communications Research division.

  Aeronautical Communications projects supported:

  - NASA's Space-Based Technologies / Advanced CNS (Communications, Navigation, and Surveillance) Architectures and System Technologies (ACAST) Project:
    - Architectures & Networks group (March 2004 - December 2005) - Research and development of transport layer mobility techniques, Mobile IPv6, NEMO mobile routers, Host Identity Protocol, Stream Control Transmission Protocol, and security for mobile networks, as applicable to aeronautical networking.
    - Surface and Terminal group (May 2005 - December 2005) - Constructed definition of airport surface network architecture for FAA operations, and analysis of appropriate protocols and technologies, including addressing, routing, performance and security considerations.
  - Sensis Corporation (East Syracuse, New York) Advanced CNS Research Program:
    - Transport Protocol Research for Mobile Networks (September 2005 - December 2005) - Identification and analysis of key research issues for mobile networking in support of network-centric aviation communications systems and airport surface wireless networks.
  - NASA support of FAA/Eurocontrol Future Communications Study (FCS):
    - Data Loading Assessments for SWIM/NEO and UAS Operations (January 2006 - present) - Tasked to compute required link rate for the Future Radio System (a new air-to-ground communications link for air traffic services and airline operational communications), including application data and overhead for network layer packetization, security, QoS, routing protocols, etc.

  Space Communications projects supported:

  - NASA Exploration Systems:
    - In-Space Routing Study (July 2005-August 2005) - Study led by Vint Cerf to evaluate automated network routing techniques (IP-like & store-and-forward) for space communications as an alternative to direct manually-controlled communications.
  - NASA Space Communications Architecture Working Group (SCAWG):
    - Network Architecture Team, Data Networking Sub-Team (September 2005 - present) - Participation in studies to identify and document protocols, standards, and technology developments for the phased implementation of the SCAWG's data networking architecture, designed to be applied throughout all NASA missions.

- **Ohio University School of Electrical Engineering and Computer Science** 2002 - 2004

  Position: Teaching Assistant

  In addition to grading and helping students to debug and understand programming projects, I delivered several lectures for the Operating Systems I and Computer Networking classes intended for senior-level undergraduates and first-year graduate students.

- **Ohio University Internetworking Research Group** 1999 - 2004

  Position: Researcher and System Administrator.

  I was an active member of the tcptrace development team (a tool for the automated analysis and visualization of TCP packet dumps *http://www.tcptrace.org*), administered several Linux and Solaris workstations and worked on several research projects.

- **NASA Glenn Research Center, Cleveland OH** 1999 - 2003

  Position: Intern

  For five years I worked as an intern under Mark Allman's guidance, conducting research for NASA's Satellite Networks and Architectures Branch. We studied topics including distributed systems over high latency links, network measurement, active queue management, and TCP enhancements for high BER links.

Professional Activities

- Association for Computing Machinery (ACM), Member 2003 - present
  - Member of the Special Interest Group on Communications (SIGCOMM).
- Upsilon Pi Epsilon, Member 2002 - present
  Charter member of Ohio University's chapter of the international computing sciences honor society.
- Engineering Ambassador 2000 - 2002
  I was appointed to represent the Computer Science program for Ohio University's Russ College of Engineering and Technology at public relations events for distinguished guests and prospective students.
- Internet Engineering Task Force (IETF) and Internet Research Task Force (IRTF) participant, active in several sub-groups, particularly:
  - TCPM - TCP Maintenance and Minor Extensions Working Group
  - TSVWG - Transport Area Working Group
  - TMRG - Transport Modeling Research Group
  - DTNRG - Delay-Tolerant Networking Research Group
- Organizer of IEEE INFOCOM 2005 panel session titled "How Does Mobility Fit Into the Internet Layering Scheme?," moderated by Joseph Ishac, with Will Ivancic, Pekka Nikander, and David Maltz participating as panelists.
- Technical Program Committee Member:
  - IEEE MobiArch 2006 (First International Workshop on Mobility in the Evolving Internet Architecture)
- Reviewer:

Journals

  - IEEE Communications Magazine (2006 - 2 papers)
  - IEEE Communications Letters (2005 - 6 papers, 2006 - 5 papers)
  - International Journal of Satellite Communications and Networking (2004 - 1 paper)
  - IEEE Transactions on Systems, Man and Cybernetics (2002 - 1 paper)

Conferences

  - ACM SIGCOMM Internet Measurement Conference 2003 - 1 paper
  - IEEE Globecom 2005 - 2 papers
  - IEEE Vehicular Technology Conference 2006 - 2 papers
  - Passive and Active Measurement Conference (PAM) 2006 - 1 paper

Publications

Journal Papers

- Wesley M. Eddy, Shawn Ostermann, Mark Allman. *New Techniques for Making Transport Protocols Robust to Corruption-Based Loss.* ACM Computer Communication Review, 34 (5), October 2004.
- Rajesh Krishnan, James Sterbenz, Wesley Eddy, Craig Partridge, Mark Allman. *Explicit Transport Error Notification (ETEN) for Error-Prone Wireless and Satellite Networks.* Computer Networks, 46 (3), October 2004.
- Mark Allman, Wesley M. Eddy, Shawn Ostermann. *Estimating Loss Rates With TCP.* ACM Performance Evaluation Review, 31 (3), December 2003.
- Wesley M. Eddy, Mark Allman. *A Comparison of RED's Byte and Packet Modes.* Computer Networks, 42 (2), June 2003

Magazine Articles

- Wesley M. Eddy. *At What Layer Does Mobility Belong?.* IEEE Communications Magazine, October 2004.

Conference Papers

- Thanh Nguyen, Wesley Eddy, Steven Bretmersky, Fran Lawas-Grodek, Brenda Ellis. *Airport Surface Network Architecture Definition.* Proceedings of the 6th ICNS (Integrated Communications, Navigation, and Surveillance) Conference and Workshop, May 2006.
- Mark Allman, Ethan Blanton, Wesley M. Eddy. *A Scalable System for Sharing Internet Measurements.* Proceedings of the Passive and Active Measurement Workshop, March 2002.

Technical Reports

NASA Technical Memorandums

- Wesley M. Eddy, Joseph Ishac. *Location Management in a Transport Layer Mobility Architecture.* NASA Glenn Research Center Technical Report TM-2005-213844, August 2005.

NASA Contractor Reports

- Wesley M. Eddy, Yogesh P. Swami. *Adapting End-host Congestion Control for Mobility.* NASA Glenn Research Center Technical Report CR-2005-213838, July 2005.
- Wesley M. Eddy *An Interoperability Consideration When Selecting Domain Parameters for Elliptic Curve Cryptography.* NASA Glenn Research Center Technical Report CR-2005-213578, March 2005.
- Wesley M. Eddy, Mark Allman. *Advantages of Parallel Processing and the Effects of Communications Time.* NASA Glenn Research Center Technical Report CR-209455, February 2000.

Standards Body Documents

IETF RFCs

- M. Duke, R. Braden, W. Eddy, E. Blanton. *A Roadmap for Transmission Control Protocol (TCP) Specification Documents.* RFC 4614, September 2006.

IETF Internet Drafts

- W. Eddy. *Using Self-Delimiting Numeric Values in Protocols.* draft-eddy-dtn-sdnv-01, work in progress, last updated as version 01, August 2006.
- W. Eddy. *TCP SYN Flooding Attacks and Common Mitigations.* draft-ietf-tcpm-syn-flood, work in progress, last updated as version 00, July 2006.
- S. Schuetz, L. Eggert, W. Eddy, Y. Swami, and K. Le *TCP Response to Lower-Layer Connectivity-Change Indications* draft-schuetz-tcpm-tcp-rlci-00, work in progress, last updated as version 00, May 2006.
- W. Eddy and W. Ivancic. *Assessment of IPv6 Maturity.* draft-eddy-ipv6-maturity-00, work in progress, last updated as version 00, May 2006.
- W. Eddy *Comparison of IPv4 and IPv6 Header Overhead.* draft-eddy-ipv6-overhead-00, work in progress, last updated as version 00, May 2006.
- W. Eddy and J. Ishac. *Comparison of IPv6 and IPv4 Features.* draft-eddy-ipv6-ipv4-comparison-00, work in progress, last updated as version 00, May 2006.
- W. Eddy. *Extending the Space Available for TCP Options.* draft-eddy-tcp-loo expired as version 03, May 2005.
- W. Eddy, J. Ishac, M. Atiquzzaman. *An Architecture for Transport Layer Mobility.* draft-eddy-tlmarch, expired as version 00, April 2004.

Working Papers for the ICAO (International Civil Aviation Organization) Aeronautical Communications Panel

- Wesley M. Eddy. *Standards and Maturity Guidance on Mobility Techniques.* discussed in Working Group N - Networking, Sub-Working Group N1 - Internet Communication Services as WP-707, Malmo, Sweden, March 2006.

Invited Presentations

Workshops and Posters

- *IETF Protocols Applicable to Space Networking*, Wesley M. Eddy, NASA SCAWG Network Technology Workshop, Reston, Virginia, August 10, 2006.
- *IPv6 Technology Gaps in Comparison to the Aeronautical Telecommunications Network*, Wesley M. Eddy, Northeast Ohio Networking Workshop (NEONet 2006), Cleveland, Ohio, March 1, 2006.
- *Technologies for IP Mobility and Multihoming Above Layer 3*, Wesley M. Eddy, NASA ACAST/SBT Workshop 2005, Cleveland, Ohio, August 17, 2005.
- *Technologies for Virtual Private Networking at the Airport Surface*, Wesley M. Eddy, NASA ACAST/SBT Workshop 2005, Cleveland, Ohio, August 17, 2005.
- *New Techniques for Making TCP Robust to Corruption-Based Loss.* Wesley M. Eddy, Shawn Ostermann, Mark Allman. NASA's Space Internet Workshop III, Cleveland, Ohio. June 2003.
- *A Comparison of RED's Byte and Packet Modes.* Wesley M. Eddy, Mark Allman. SIGCOMM 2002 student poster session, Pittsburg, Pennsylvania. August 2002.
  With abstract in ACM Computer Communication Review, 32 (3), July 2002.

IETF Meetings

- *Combined Fixes for TCP Over Dynamic Paths*, presented to TCPM WG at IETF 66 in Montreal, Canada, July 2006.
- *TCP SYN Flooding Attacks and Common Mitigations*, presented to TCPM WG at IETF 66 in Montreal, Canada, July 2006.
- *TCP Roadmap (Revision 00)*, presented to TCPM WG at IETF 61 in Washington D.C., October 2004.
- *An Architecture for Transport Layer Mobility (Revision 00)*, presented to TSVWG at IETF 61 in Washington D.C., October 2004.

Technical Seminars

- *Building Cryptographic Enhancements Into TCP*, NASA Research and Technology Directorate, Communications Division Technical Seminar, Cleveland, OH, February 17, 2005.
- *New Techniques for Making TCP Robust to Corruption-Based Loss*, USC/ISI Div7 Seminar, Marina del Rey, CA, December 8, 2003.

Awards

- RS Information Systems "Delighting the Customer" Award, for performance on the NASA Glenn Research Center PACE contract, contributing to "excellent" ratings in customer service, cost control, timeliness, and program management.
  - July - December 2004
  - January - June 2005
- Academics:
  - National Merit Scholar (sponsored by AlliedSignal/Honeywell)
  - Alpha Lambda Delta Honor Society
  - Golden Key Honor Society
  - Ohio University Dean's List
  - Ohio University Distinguished Scholar
- Eagle Scout (with Silver Palm)

References available upon request.